

Claims

[c1] 1. An electric membrane switch, suitable for selectively delivering seven control signals with which to control other such differentiated operations, of the type comprising a membrane (11) on one or more areas on which one or more pushers act and which has associated contacts susceptible to closing an electric circuit when said membrane (11) is shifted, generating an electric signal, and to opening said circuit when it elastically returns to a standstill position, characterized by comprising a laminar membrane (11) element on one side of which nine support means (12, 13a, 13b) of eight actuator means (14a, 14b) and a piston (21) element are arranged, the latter in central position (12) and the remaining ones (13a, 13b) distributed around it, each one associated to a corresponding contact, said actuator means (14a, 14b) being constituted by several pins (14a, 14b) susceptible to being actuated individually in pushing against said membrane (11) as from a piston (21) element, the central pin as from a cap (32) with four pins (33), said pins (33) being supported on the rounded ends of four of said pins (14b), the four remaining pins (14a) being actuated in pairs by the arms (25) of a crosspiece (24) finished in

slanted ramps (26a, 26b), the cap (32) and crosspiece (24) being actuated from a single rod (28) element passing through them and coupled to them, said rod (28) element being finished by an actuation member (42).

[c2] 2. An electric membrane switch according to claim 1, characterized in that the laminar membrane (11) element is provided with support means (12, 13a, 13b) for supporting actuator means (21, 14a, 14b) of the device and means for receiving its selective impulse and transmitting it to a printed circuit board (15) associated to them, for the purpose of closing a circuit and favoring the elaboration of an electric control signal, inducing said actuator means(21, 14a, 14b) to their initial inoperative position when said impulse stops by means of their elastic memory, inoperative when said impulse stops; said support means (12, 13a, 13b), nine of them, being truncated-pyramid bases elevated from one of the surfaces of the laminar membrane (11), said support means (12, 13a, 13b) housing outside electric contact means on their opposite surface and adjacent to said printed circuit board (15); of said support means (12, 13a, 13b), one being arranged in the center (12) and the remaining ones aligned in three's (13a, 13b), the four support means (13a) located in the corners being arranged equidistant with regard to the central one, and the inter-

mediate support means (13b) being arranged in a different equidistance.

- [c3] 3. An electric membrane switch according to claim 1, characterized in that the eight actuator means (14a, 14b) in cylindrical pin (14a, 14b) form have a support base suitable for being supported respectively on each one of the peripheral support means (13a, 13b) and their end opposite to the support is rounded, said cylindrical pins (14a, 14b) being suitable for receiving an impulse on their rounded end and linearly transmitting it to the support means (13a, 13b), said support means (13a, 13b) being supported on a base plate (16) having passages (18a, 18b) suitable for housing the actuator means (14a, 14b), these actuator means (14a, 14b) projecting through the upper plane of the base plate (16) and permitting a linear shift thereof (14a, 14b), said base plate (16) provided with a central housing (17) suitable for housing a piston (21) element, permitting contact between said piston (21) element and the central support element (12) of the membrane (11) element.
- [c4] 4. An electric membrane switch according to claim 1, characterized in that the cylindrical-shaped piston (21) element has a peripheral flange (22) of a polygonal area on one of its ends and a pivoting support element in the form of a lug (23) axially on said end with regard to the

body, said piston (21) element being suitable for being introduced in the central housing (17) of the base plate and establishing contact with the central support means (12) of the membrane (11) element, and optionally induces its electric contact means to enter into electric fluid contact with the printed circuit board (15), closing a circuit on it and making the board (15) emit a control signal; its relative linear position being defined inside of said housing (17) by means of an enveloping spring (20) susceptible to carrying out a linear shift due to a push carried out on its lug (23), counteracting the expansive action of the spring (20), and to recovering its initial position when said pressure stops, due to the action of the memory of the spring (20).

[c5] 5. An electric membrane switch according to claim 1, characterized in that the crosspiece (24) element in the form of a cylindrical body with a truncated pyramid-shaped central passage (27) with a polygonal section, the lower part corresponding to the perimeter of the flange (22) of the piston (21) element on which the crosspiece (22) sits preventing the rotational shifting between them both, is provided with four transversal arms (25) whose lower free ends, in direction to the piston (21) element, are provided with a linear cam surface (26a, 26b) on inclined plane transversal to the center and with said in-

clined plane being opposite with regard to the adjacent arms (25); said crosspiece (24) element being housed on the piston (21) element, the cam planes (26a, 26b) of the ends of its arms (25) thus being supported on the peripheral actuator (14a) corner elements, such that by inducing a rotation movement to said crosspiece (24) element, every two opposite cam (26a, 26b) surfaces of its arms (25) supported on the actuator (14a) elements will press on or will be distanced from them, according to the clockwise or counter-clockwise rotation direction, and pressing, respectively, on two of the corner actuator (14a) elements, opposite from each other, in one direction and the other two in the opposite direction, returning to their initial position by means of said cam (26a, 26b) surfaces when the rotational impulse stops, and being provided with a central passage (27) on its upper part, having a polygonal section suitable for housing the rod (28) element.

[c6] 6. An electric membrane switch according to claim 1, characterized in that the cylindrical-shaped rod (28) element has a cubic bulking (29) on its lower end, corresponding to and suitable for being loosely housed on the upper part of the central passage (27) of the crosspiece (24) element, permitting its linear and pivotal shift, but preventing its rotational shift, said lower end (29) of the

rod (28) axially provided with a cavity suitable for being pivotally seated on the lug (23) of the piston (21) element, the upper end of said rod (28) element being provided with a transversal groove (31) and, perimetrical and close to the cubic bulking (20) of its lower end, a peripheral flap (30) in spherical crown form, suitable for housing the cap (32) element.

- [c7] 7. An electric membrane switch according to claim 1, characterized in that the cap (32) element in laminar spherical cap form, has a central cylindrical passage (34) corresponding to the cylindrical body of the rod (28) element, and four pins (33) in downward projection spaced 90° from each other, suitable for when said cap (32) element is housed on said rod (28) element, until being seated on its flap (30), said pins (33) being seated on the end of the intermediate actuator (14b) elements, such that by inducing a pivoting impulse on said rod (28) element, the latter drags the cap (32) element in one of the four directions defined by said pins (33) pressing on the corresponding actuator (14b) element and returning to its initial position when said pivoting impulse stops.
- [c8] 8. An electric membrane switch according to claim 1, characterized in that it is provided with a body (35) element in laminar portion form with an area corresponding to the area of the membrane (11) element and the asso-

ciated printed circuit board (15), provided with separator means (38) and fixing means (39, 40) between the body (35) element and said membrane (11) element in the form of solidly fixed columns (39) projecting downwards, suitable for being fixed to said membrane (11) means and holding the axial-linear position of the intermediate elements, being provided with additional fixing means in the form of laminar bands (39) spaced from each other, downwardly arranged from its lower surface and adjacent to the edge of two of its opposite sides, said laminar bands (39) having a triangular projection on their inner side end for embedding in bayonet form on the lower edge of the base plate element (16), also having guide means (40) in the form of downward laminar bands (40), centered and adjacent to the edges for being housed on the lateral recesses (19) of said base plate element (16), said body (35) element also being provided with a centered semi-spherical dome (36) on its upper surface for being housed on the cap (32) element and permitting a shift like a ball joint, which has four grooves (37) inside arranged 90° from each other, said grooves corresponding to the pins (33) of the cap (32) element which, when said pins (33) are fitted in said grooves (37), they will limit the rotation between the cap (32) element and the body (35) element, said dome (36) being provided with a central cross-shaped passage (41) on its

zenith, suitable for permitting the projection of the grooved (31) end of the rod (28) element and guiding its pivotal shift in four different directions, also being provided with a control (42) element in button form, suitable for being housed on the grooved (31) end of the rod (28) element, and suitable for receiving a linear impulse, respective rotation impulses and four different pivoting impulses from a user with which seven different control signals can be generated.

[c9] 9. An electric membrane switch according to claim 1, characterized in that the linear pressure exerted on the control (42) element is transmitted to the rod (28) element, which in turn transmits it to the piston (21) element on which it is seated, said piston (21) element counteracting the action of an associated spring (20) pushing the central cone (12) of the membrane (11) element which, when entering into electric fluid contact with the corresponding circuit of the printed circuit board (15), emits a first control signal; the rotational impulse exerted on said control (42) element is transmitted to the rod (28) element, transmitting said impulse in turn to the crosspiece (24) element which, by means of the cam (26a) surfaces of its arms, presses on two opposite actuator (14a) elements, according to its rotation, which, upon pressing on the cones (13a) on which they are

seated, will propitiate the emission of two different control signals, one signal when the rotation is clockwise and another different signal when it is a counter-clockwise movement; and the pivotal shift induced on the control (42) element in any of the four opposite trajectories defined by the cross-shaped passage (41) of the body (35) element causes the jointed shift of the cap (32) element, and in consequence, the corresponding pin (33) presses against the actuator (14b) element on which it is seated, in order to produce a differentiated pulse for each one of said four movements.